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CONTENTS

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THE IMPORTANCE OF SAVING FOR EDUCATION IN JAPAN*

By Charles Yuji HORIOKA**

I Introduction

Japan is often called a *gakureki shakai* (education-oriented society) because an individual's educational background has such a pervasive influence on all facets of his life, from his employment prospects to his marriageability. Not surprisingly, therefore, Japanese parents place great emphasis on their children's education and make enormous sacrifices in order to secure the best possible education for their children. One manifestation of this tendency is the extent to which Japanese parents save in advance for their children's educational expenses, and it has even been suggested that the greater importance of saving for education in Japan is a major cause of her exceptionally high household saving rate. In this paper, I attempt to quantify the importance of education-related saving using data from a variety of sources.

In Section II, I analyze the impact of educational expenditures on the saving patterns of individual households, while in Section III, I estimate the contribution of education-related saving to Japan's aggregate household saving rate. My principal finding is that educational expenditures have a significant impact on the saving patterns of individual households, raising the saving rates of households with pre-high school children and lowering the saving rates of households with children in high school or college, but that the greater importance of education-related saving in Japan is not a major explanation of the high level of Japan's *aggregate* household saving rate.

II The Impact of Educational Expenditures on the Saving Patterns of Individual Households

In this section, I will analyze the impact of educational expenditures on the saving patterns of individual households, but first, it will be helpful to obtain an indication of the level of educational expenditures in Japan. As Table 1 shows, in Japan, educational expenditures comprised between 2.6 and 4.0 percent of total consumption expenditures during the 1963–84 period when narrowly defined and between 4.8 and 6.7 percent of total consumption expenditures during the 1970–84 period when broadly defined, with both series showing a downward trend until about 1973 and an upward trend thereafter. By contrast, educational expenditures have been far lower in the

* This article is based in part on Chapter 2 of the author's doctoral dissertation (Horioka (1985)). I am indebted to Ruby Horioka for all her assistance.

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Table 1. A U.S.-Japan Comparison of Educational Expenditures

Year	Expenditures on education as a percent of total consumption expenditures		
	Japan (narrow definition)	Japan (broad definition)	United States
1963	3.4	na	1.2
1964	3.6	na	1.3
1965	3.9	na	1.3
1966	3.8	na	1.4
1967	3.6	na	1.5
1968	3.3	na	1.5
1969	2.9	na	1.5
1970	2.7	5.2	1.6
1971	2.7	5.1	1.6
1972	2.6	4.9	1.6
1973	2.6	4.8	1.6
1974	2.6	5.0	1.6
1975	2.8	5.3	1.6
1976	3.1	5.6	1.6
1977	3.2	5.7	1.5
1978	3.4	6.0	1.5
1979	3.4	6.2	1.5
1980	3.6	6.3	1.6
1981	3.7	6.6	1.6
1982	3.8	6.6	1.6
1983	3.7	6.5	1.5
1984	4.0	6.7	na

Notes: The narrow definition of educational expenditures includes expenditures on school fees, school textbooks, student workbooks, and tutorial education. The broad definition of educational expenditures includes all of the above expenditures plus expenditures on school lunches, school uniforms, student train and bus passes, study desks and chairs, knapsacks, stationery supplies, dictionaries, and remittances to students living away from home. The figures for the United States represent expenditures on private education and research, including higher education, elementary and secondary schools, and other.

na denotes not available.

Sources: For data on Japan, narrow definition, 1963–80, Prime Minister's Office, Statistics Bureau (Sōrifu, Tōkei-kyoku), *Shōwa 38-nen—55-nen no Kakei: Shin Shūshi Kōmoku Bunrui ni yoru Sakkyū Kekka* (Family Income and Expenditure Survey, 1963–1980) (Tokyo: Zaidan Hōjin Nihon Tōkei Kyōkai, 1981), Table 1, pp. 14–23. The data refer to all households nationwide.

For data on Japan, narrow definition, 1981–84, and broad definition, 1970–84, Management and Coordination Agency, Statistics Bureau (Sōmu-chō, Tōkei-kyoku), *Kakei Chōsa Nenpō* (Annual Report on the Family Income and Expenditure Survey), 1984 edition (Tokyo: Zaidan Hōjin Nihon Tōkei

Kyōkai, 1985), Table 1, pp. 56–67. The data refer to all households nationwide.

For data on the United States, United States Department of Commerce, Bureau of Economic Analysis, *The National Income and Product Accounts of the United States, 1929–76: Statistical Tables* (A Supplement to the *Survey of Current Business*) (Washington, D.C.: United States Government Printing Office, 1981), Table 2.4, pp. 89–95; *Survey of Current Business*, July 1982, Table 2.4, pp. 40–41; and *Survey of Current Business*, July 1984, Table 2.4, pp. 37–38.

Table 2. College Education Costs in Japan

Fiscal Year	Total Education Costs	Annual Rate of Increase	Family Contribution	Family Contribution Ratio	Annual Rate of Increase	Interest Rate
A. Four-Year Universities						
1966	224.4 (84.9)	—	172.2 (65.1)	76.7%	—	—
1968	281.9 (81.5)	12.1%	232.2 (67.2)	82.4	16.1%	5.50%
1970	345.5 (74.9)	10.7	269.1 (58.3)	77.9	7.7	5.62
1972	403.9 (69.4)	8.1	308.1 (52.9)	76.3	7.0	5.57
1974	571.0 (64.2)	18.9	420.9 (47.3)	73.7	16.9	6.87
1976	742.2 (67.9)	14.0	579.6 (53.0)	78.1	17.3	7.05
1978	900.3 (71.0)	10.1	705.3 (55.6)	78.3	10.3	5.06
1980	1082.2 (74.1)	9.6	830.3 (56.9)	76.7	8.5	6.59
1982	1230.5 (77.4)	6.6	998.4 (62.8)	81.1	9.7	5.96
B. Two-Year Junior Colleges						
1966	n.a.	—	n.a.	—	—	—
1968	268.1 (77.5)	—	251.6 (72.8)	93.8%	—	—
1970	310.4 (67.3)	7.6	280.3 (60.7)	90.3	5.5	5.62
1972	353.8 (60.8)	6.8	309.0 (53.1)	87.3	5.0	5.57
1974	505.7 (56.8)	19.6	422.8 (47.5)	83.6	17.0	6.87
1976	690.1 (63.1)	16.8	581.9 (53.2)	84.3	17.3	7.05
1978	824.9 (65.0)	9.3	715.8 (56.4)	86.8	10.9	5.06
1980	916.8 (62.8)	5.4	784.6 (53.7)	85.6	4.7	6.59
1982	1036.2 (65.2)	6.3	981.4 (61.6)	94.7	11.8	5.96

Notes: Total education costs and the family contribution thereto are in units of thousands of yen per academic year and include tuition and other fees as well as living expenses. The figures shown represent averages for all day division students (including those at national public, and private institutions and those living at home, in dormitories, and in apartments and rented rooms). The figures in parentheses represent percentages of per capita household disposable income.

The family contribution ratio was calculated as the family contribution as a percentage of total education costs.

The interest rate shown is the yield on one-year term deposits at banks; the two-year average of daily rates during the current and previous fiscal years was used.

na denotes not available.

All data are on an academic year (fiscal year) basis (April 1-March 31) except that the population as of October 1 (the midpoint of the academic year) was used to compute per capita household disposable income.

Sources: For data on total education costs and the family contribution, the "Gakusei Seikatsu Chōsa" (Survey on Student Life), the results of which are presented in Ministry of Education, Minister's Secretariat, Research and Statistics Section (Monbushō, Daijin Kanbō, Chōsa Tōkei-ka), ed., *Monbu Tōkei Yōran* (Handbook of Statistics on Education), 1983 edition (Tokyo: Dai-ichi Hōki Shuppan Kabushiki-kaisha, 1983), Table 3(a), pp. 302–304, and the 1984 edition of the same, pp. 148–149.
For data on household disposable income, Economic Planning Agency (Keizai Kikaku-chō), ed., *Kokumin Keizai Keisan Nenpō* (Annual Report on National Accounts), 1985 edition (Tokyo: Ōkura-shō, Insatsu-kyoku, 1985), Account 5, pp. 16–17, and the 1983 edition of the same, Account 5, pp. 34–35.

For population data, Prime Minister's Office, Statistics Bureau (Sōrifu, Tōkei-kyoku), ed., *Nihon Tōkei Nenkan* (Japan Statistical Yearbook), 1983 edition (Tokyo: Nihon Tōkei Kyōkai and Mainichi Shinbunsha, 1983), Table 2–1, pp. 23–25. The data are either census data or official government estimates.

For data on interest rates, The Bank of Japan, Research and Statistics Department (Nihon Ginkō, Chōsa Tōkei-kyoku), ed., *Keizai Tōkei Nenpō* (Economics Statistics Annual) (Tokyo: Nihon Ginkō, annual), various issues.

United States, ranging from 1.2 to 1.6 percent of total consumption expenditures during the 1963–1983 period. Since the United States definition of educational expenditures is roughly comparable to the narrow Japanese concept, it can be seen that educational expenditures have been one-and-a-half to three times higher in Japan than in the United States as a percent of total consumption expenditures.

Thus, the above data suggest that educational expenditures are far more significant in Japan than they are in the United States but that they are not a dominant component of consumption expenditures, even in Japan. The problem with the above data, however, is that they represent an average over all households, including those not making any educational expenditures. This problem is avoided in Table 2, which shows total education costs and the family contribution to education costs per college student.[1] As this table shows, total education costs (including living expenses) per student have ranged from 64.2 to 84.9 percent of per capita household

1) The other figures in Table 2 will be discussed later.

disposable income in the case of four-year universities and from 56.8 to 77.5 percent of per capita household disposable income in the case of two-year junior colleges, which represents a rather sizable amount. Reassuringly, these data exhibit essentially the same trends over time as the aggregate data presented earlier, falling until about 1974 and rising thereafter. Comparable data for other countries are difficult to obtain, but data recently released by the College Board indicate that the total cost per year at colleges and universities in the United States for students living on campus will average $5314 at four-year public institutions and $9659 at four-year private institutions during the 1985–86 academic year (Bowen (1985, p. 44)). These figures include tuition, books and supplies, housing, transportation, and incidentals and hence are comparable in scope to the Japanese figures presented above. Thus, the fact that they represent roughly 45 and 85 percent, respectively, of per capita personal disposable income suggests that college costs in the two countries are of approximately the same magnitude relative to income.

It is still possible, however, that the family (or parental) contribution to education costs is higher in Japan inasmuch as scholarships and educational loans are far less available in Japan and reliance on earnings from term-time and summer employment is also less (see, for example, Yoshitomi (1980, p. 275)). In fact, as Table 2 shows, the family has borne a full 73 to 95 percent of college education costs in Japan, a figure that is undoubtedly much higher than in other countries. As a result, the family contribution to college education costs per student has amounted to 47.3 to 67.2 percent of per capita household disposable income in the case of four-year universities and to 47.5 to 72.8 percent of per capita household disposable income in the case of two-year junior colleges. These figures imply that a family of three with a child in college would have to spend roughly 16 to 24 percent of its disposable income on college education costs, while a family of four with one child (two children) in college would have to spend roughly 12 to 18 percent (24 to 36 percent).[2] These are significant amounts which households are unlikely to be able to finance entirely out of current income.

In sum, the level of education costs (or at least of the family contribution thereto) is high in Japan both in absolute terms and relative to the United States, and it is therefore likely that Japanese families feel the need to save in advance in order to finance their children's educational expenses and, moreover, that they feel this need to a greater extent than families in the United States.

Direct evidence on the importance of saving for one's children's educational ex-

2) I should point out, however, that inasmuch as the family contribution includes the amount that goes toward the student's living expenses, it is partly offset by a reduction in living expenses at home (in the case of students who live away from home to attend college). I believe, though, that the latter amount is likely to be small relative to the former because of economies of scale in household consumption. Jorgenson and Slesnick (1982, p. 33) have found that "general household equivalence scales are observed to ...[increase]... at a slower rate than the increase in the number of family members so that economies of scale are seen to hold," meaning that household consumption decreases only moderately in response to a decline in the number of members.

Table 3. Motives for Household Saving in Japan

Motive	Percent of respondents for whom each motive is one of their three most important motives for saving		Percent of respondents for whom each motive is their single most important motive for saving	
	1984	1985	1984	1985
In preparation for illness and other unexpected disasters	75.0 (1)	77.2 (1)	34.4 (1)	31.4 (1)
For one's children's educational expenses	41.6 (3)	43.0 (2)	13.8 (3)	14.6 (3)
For one's children's marriage expenses	17.6 (6)	17.1 (6)	4.5 (6)	3.5 (6)
For the purchase, expansion, renovation, etc., of land/housing	26.3 (4)	19.8 (5)	12.3 (4)	9.0 (4)
For living expenses during old age	42.1 (2)	42.5 (3)	15.5 (2)	16.6 (2)
For the purchase of consumer durables	7.5 (8)	10.5 (7)	1.1 (7)	0.9 (7)
For leisure	9.7 (7)	4.8 (9)	1.0 (8)	0.5 (9)
For the payment of taxes	5.2 (9)	5.4 (8)	0.9 (9)	0.7 (8)
No specific motive but for a feeling of security	25.7 (5)	26.4 (4)	6.5 (5)	6.6 (5)
Other	1.2	1.6	0.7	1.0
Totals	251.9	248.3	90.7	84.8

Note: The figures in parentheses represent the rank of each motive.

Source: The Central Council for Savings Promotion (Chochiku Zōkyō Chūō Iinkai), *Chochiku ni kansuru Seron Chōsa* (Public Opinion Survey on Saving), 1985 edition (Tokyo: Chochiku Zōkyō Chūō Iinkai, 1985), Tables 8 and 9, p. 112.

penses as a motive for saving is provided by the Public Opinion Survey on Saving, which is conducted annually by the Central Council for Savings Promotion. This survey collects information on the percent of respondents who regard each motive as one of their three most important motives for saving and on the percent who regard each motive as their single most important motive for saving, and as Table 3 shows, the 1984 and 1985 administrations of the survey found that, by the first measure, saving for one's children's educational expenses is virtually tied with saving for living expenses during old age as the top specific motive for saving, with more than forty percent of respondents citing each of these motives as one of their top three motives for saving. Thus, these two motives far outweigh the other specific motives for saving—namely, housing-related saving, saving for one's children's marriage expenses, saving for the purchase of consumer durables, saving for leisure, and saving for the payment of taxes (listed in decreasing order of importance). (The two remaining motives—"in preparation for illness and other unexpected disasters" and "no specific motive but for a feeling of security" are essentially precautionary motives rather than specific motives.) Furthermore, the rank order of the various motives for saving remains virtually unchanged when they are ranked by the percent of respondents citing each motive as their single most important motive for saving, except that saving for one's

children's educational expenses is now slightly less important than saving for living expenses during old age, with 13 to 15 percent of respondents citing the former as their single most important motive for saving versus 15 to 17 percent in the case of the latter. Until 1983, the aforementioned survey listed saving for one's children's education and marriage expenses as a single motive, and hence the results of earlier administrations of the survey are not directly comparable with the 1984–85 results, but it is worth noting that the combined motive was consistently found to be by far the single most important specific motive for saving, with more than half of the respondents citing it as one of their top three motives for saving and 15 to 20 percent citing it as their single most important motive for saving (Central Council for Savings Promotion (1985, Tables 8 and 9, p. 112)). Similar surveys that have been conducted in the United States have found that saving for one's children's educational expenses is far less important as a motive for saving in the United States, lagging well behind saving for living expenses during old age (see Horioka (1984, pp. 48–49)).

It thus appears that saving for education is indeed a dominant motive for saving in Japan and, moreover, that it is of far greater importance in Japan than it is in the United States. It should be noted, however, that this conclusion is based on data on the percent of households saving for each motive, which represent only one measure of the relative importance of the various motives for saving. Another indicator is the target amount of saving for each motive. Such data were collected as part of a household survey in 1966 (unfortunately, more recent data are not available) and are presented in the first column of Table 4.[3] As these figures show, the average target amounts for old age, future business capital, and land/housing purchase are by far the highest, with those for education, marriage, unexpected expenditures, purchases of consumer durables, and recreation following in that order. Thus, by this standard, saving for education is not one of the top motives for saving but still ranks fairly high. Moreover, the absolute level of the target amount for education (762,000 yen in 1966) is considerable, equaling a full 2.75 times per capita household disposable income.[4] In sum, not only does a high percentage of households save for educational expenses, but their average target amount for this purpose is also substantial.

The most direct evidence concerning the impact of one's children's educational expenses on the saving patterns of individual households is provided by the National Survey of Family Income and Expenditure, a household budget survey that is con-

3) The other data in Table 4 will be analyzed in the next section. I am grateful to Professor Kazuo Sato for calling these data to my attention.

4) Per capita household disposable income in fiscal year 1966 was 264,330 yen if calculated using data on household disposable income from Economic Planning Agency (1983, pp. 34–35) and population data from Management and Coordination Agency, Statistics Bureau (1984, pp. 23–25). The ratios of the average target for each motive to per capita household disposable income are as follows: 12.82 for old age, 11.69 for future business capital, 9.65 for land/housing purchase, 2.75 for education, 2.32 for marriage, 1.37 for unexpected expenditures, 0.73 for purchases of consumer durables, and 0.51 for recreation. Unfortunately, no data are available on the target amount for the payment of taxes, the only other specific motive included in Table 3.

Table 4. Saving Targets by Motive

Motive	The average target per motive for households saving for each motive (thousands of yen)	The percent of households saving for each motive	The aggregate target for each motive as a percent of the aggregate target for all motives
Old age	3389 (1)	42.5 (3)	53.7 (1)
Future business capital	3089 (2)	na	na
Purchase of land/housing	2550 (3)	19.8 (4)	18.8 (2)
Children's education	726 (4)	43.0 (2)	11.6 (3)
Children's marriage	614 (5)	17.1 (5)	3.9 (5)
Unexpected expenditures	363 (6)	77.2 (1)	10.5 (4)
Purchase of durables	192 (7)	10.5 (6)	0.8 (6)
Recreation	136 (8)	4.8 (8)	0.2 (7)
Payment of taxes	na	5.4 (7)	na
Other	662	1.6	0.4

Notes: na denotes not available.

The figures in parentheses denote the rank of each motive.

Source: The target data in the first column are from the "Shōhisha-no Seikatsu Ishiki-to Shōhi Chochiku Kōdō-ni-kansuru Jittai Chōsa" (Survey concerning the Attitudes and Consumption/Saving Behavior of Consumers), which was conducted by the Research Institute on National Life (Kokumin Seikatsu Kenkyūsho) in November 1966. 551 regular households living in the 23-ward area of Tokyo, Musashino City, and Mitaka City were surveyed. The data are presented in Research Institute on National Life (Kokumin Seikatsu Kenkyūsho), ed., *Kokumin Seikatsu Tōkei Nenpō* (Statistical Yearbook on National Life), 1969 edition (Tokyo: Shiseidō, 1969), Table 160, p. 164.

The data on the percent of households saving for each motive (second column) are reproduced from Table 3. The figures are for 1985 and denote the percent of households for which each motive is one of the three most important motives for saving.

The figures in the third column were computed from the figures in the first two columns as follows: the product of the first two columns was calculated and scaled so that the sum of the products would equal 100.

ducted every five years by the Management and Coordination Agency, Statistics Bureau (formerly the Prime Minister's Office, Statistics Bureau). I have used this data source because its sample size is far larger than that of any other similar survey (more than 50,000 households in the 1979 survey) and because it provides the most detailed breakdowns by household characteristics. The survey's offsetting weaknesses are, first, that it is conducted only every five years; second, that it obtains detailed data on income, taxes, and saving only for worker households; and third, that it obtains data only for the months of September through November, a period which is not representative of the year as a whole (for one thing, it excludes the two dates on which sizable bonuses are paid to many workers). As a result of the second weakness, saving rates could not be computed for non-worker households (households in which the head is an individual proprietor, corporate administrator, self-employed professional, unemployed,

retired, or engaged in an occupation not classified elsewhere), and thus the analysis had to be confined to worker households only. With respect to the third weakness, the exclusion of months during which bonuses are paid will cause the saving rate figures to be biased downward because the saving rate out of bonus income is much higher than that out of regular income. These points will have to be borne in mind when interpreting the data.

The National Survey of Family Income and Expenditure (hereafter referred to as the NSFIE) contains two types of data that are amenable to an analysis of the impact of educational expenses on household saving. The first type is data on the saving rate (the ratio of saving to disposable income) of worker households cross-tabulated by household composition and life-cycle stage. Such data are presented in Table 5, and

Table 5. The Impact of Household Composition and Life-Cycle Stage on the Household Saving Rate

	Average	Age≤2	Age 3–6	Elementary school	Junior high school	Senior high school	College or university	Age 15–21, non-student	Age≥22, non-student
Average	12.9 (18.8)								
Nuclear family	12.3 (18.3)								
Married couple (no children)	15.0 (19.8)								
Married couple (1 child)	12.2 (17.7)	11.0 (11.3)	11.8 (15.8)	13.1 (16.8)	13.5 (23.4)	3.8 (21.9)	−0.1 (18.3)	17.6 (22.3)	18.7 (22.1)
Married couple (2 children)	12.3 (18.5)	11.1 (11.4)	11.2 (16.2)	13.8 (18.8)	14.9 (21.4)	10.3 (20.1)	−2.3 (14.4)	17.5 (23.1)	14.0 (17.8)
Married couple (3 or more children)	11.0 (18.5)	13.0 (18.7)		12.2 (18.5)	10.9 (18.4)	11.1 (21.5)	−3.0 (16.3)	7.9 (13.8)	13.5 (18.4)
Single parent & children	7.7 (11.8)	2.1 (8.4)				−2.0 (12.6)			
Married couple & parents	14.6 (22.1)								
Married couple, children, parents	14.0 (20.4)								

Notes: The column headings refer to the age or educational level of the eldest child.

The upper figure represents the household saving rate, while the lower figure (in parentheses) represents the sum of household saving and education-related expenditures as a percent of disposable income.

Source: Prime Minister's Office, Statistics Bureau (Sōrifu, Tōkei-kyoku), *Zenkoku Shōhi Jittai Chōsa Hōkoku* (Report on the National Survey of Family Income and Expenditure), 1979 edition (Tokyo: Zaidan Hōjin Nihon Tōkei Kyōkai, 1981), volume 1, part 1, Table 14, pp. 170–173.

as the upper figures in this table show, when household composition is held constant (that is, when reading across any given row), the saving rate increases as the eldest child approaches high school age, from about 11 percent when the eldest child is less than two years of age to 13 to 15 percent when the eldest child is in junior high school. (This is true of married couples with one or two children but not of married couples with three or more children.) Note, moreover, that, in the case of married couples with one or two children, the saving rate is higher when the eldest child is in elementary or junior high school than for every other life-cycle stage except for the stage in which the eldest child has completed his education[5] and is also higher than the average saving rate of all households of the corresponding household type. These findings suggest that households are saving partly for their children's high school and college expenses and that they intensify their saving efforts as the date of high school entrance approaches. The differences in saving rates are not very substantial, but this may be partly due to the fact that the data pertain to all households with pre-high school children, including those with no plans to send their children to high school or college. The differences would undoubtedly be more pronounced if separate data were available on the saving rates of households with pre-high school children which plan to send their children to high school or college.

Much more striking is the saving behavior of households in which the eldest child is in high school or college. The same table shows that, holding household composition constant, the saving rate is sharply lower for households in which the eldest child is attending college or university and somewhat lower for households in which the eldest child is attending high school. In fact, the saving rate of households in which the eldest child is attending college or university is consistently *negative* and twelve to fifteen percentage points lower than the average saving rate of all households of the corresponding household type![6] Thus, savings are drawn down (or built up the least rapidly) when the household has children in high school or college, which provides further confirmation that saving for one's children's educational expenses is a major motive for household saving.

One point which requires a word of explanation is why one would expect the educational expenses of high school students to be any higher than those of students in elementary or junior high school. For one thing, although tuition is free at public elementary and junior high schools, parents of high school students must pay tuition,

5) Possible reasons why the saving rate of households in which the eldest child has completed his education is higher include the following: (1) their child (children) may be working and saving out of his (their) own income in preparation for marriage and other purposes, (2) they will tend to have higher incomes because the age of the head will tend to be higher, (3) they may be engaged in more intensive efforts to save in preparation for life during retirement because the head will tend to be older and closer to retirement, and (4) they may be saving for the marriage expenses of their children or for the educational expenses of their younger children.

6) The saving rate figures might not be negative if calculated using data pertaining to the entire year (recall that the saving rate figures are biased downward because they are based on data for the September-November period, which excludes the months during which bonuses are paid).

even at public high schools, and many other expenses are also higher for high school students (see, for example, Ministry of Education, Minister's Secretariat, Research and Statistics Section (1985, pp. 148–149)). Second, tuition and other fees are naturally much higher at private schools than at public schools, and the proportion of students attending private schools is much higher at the high school level than at lower grade levels.[7] Third and more importantly, many Japanese parents enroll their high school-age children in *juku* (schools offering supplementary classes) and/or hire private tutors, primarily for the purpose of preparing their children for their college entrance examinations, and the parents of children who failed their college entrance examinations on their first attempt often enroll their children full-time in *yobikō* ("prep schools" designed to prepare students for their college entrance examinations) for one or more years. The cost of all of these types of supplementary education is substantial and has come to constitute an enormous burden on the parents of pre-college children. Thus, Japanese parents must save not only for their children's college expenses but also for their educational expenses during high school, and the above findings suggest that both are important although the former are apparently somewhat more important than the latter.

Further corroboration of the impact of educational expenses on household saving behavior is provided by the *lower* figures in Table 5 (the figures in parentheses), which represent the household's saving *plus* its education-related expenses as a percent of its disposable income. In other words, they represent what the household's saving rate would have been *if* it had not incurred any education-related expenses *and* the entire amount spent on education-related expenses had been saved. A glance at these figures shows that, when household composition has been controlled for, the "adjusted" saving rate of households in which the eldest child is attending high school or university is not unusually low, indicating that the much higher educational expenditures of households with children in high school or college are capable of explaining their much lower saving rates.

It should be noted, however, that throughout the foregoing analysis, I have not been able to control for household characteristics other than household composition due to data limitations. Moreover, an additional objection that might be raised is that the nature of the data (in particular, the fact that they pertain to the September through November period only) may lead to serious biases because educational expenses are not spread evenly throughout the year. In Japan, the academic year runs from April until March with new semesters beginning in April and October. As a result, tuition and other fees are generally paid in March-April and September-October and entrance fees are generally paid in March-April. Moreover, one would expect other education-related expneses such as expenditures on textbooks and other

7) For example, in 1984, 28.0 percent of high school students attended private schools whereas only 0.5 percent of elementary school students and 2.9 percent of junior high school students did so (Ministry of Education, Minister's Secretariat, Research and Statistics Section (1985, pp. 44, 47, and 53)).

school supplies to be concentrated during these periods as well (especially during the March-April period). The foregoing analysis showed that the saving rate of households with a child in high school or college is much lower than that of other households and that differences in education-related expenses are capable of explaining the bulk of the differences in saving rates, but these conclusions may have arisen solely because the data pertain to the September-November period during which a disproportionate share of educational expenses are incurred. It could be that, during other months, the saving rate of households with a child in high school or college is much higher and their educational expenses much lower than they are during the September-November period. However, monthly data on education-related expenditures from the Family Income and Expenditure Survey, which is conducted on an ongoing basis throughout the year by the Management and Coordination Agency, Statistics Bureau, show that the ratio of education-related expenditures to disposable income is only slightly higher during the September-November period than during the year as a whole (0.062 versus 0.052) (see Horioka (1985, pp. 67–69)). It thus appears that the September-November period is roughly representative of the year as a whole in terms of the level of education-related expenditures, implying that the aforementioned biases

Table 6. The Household Saving Rate by Yearly Income and Whether or Not the Household Has a Student in College or University (1969 Data)

		Yearly income group								
	Average	1	2	3	4	5	6	7	8	9
All worker households	7.0 (27,981)	−30.8 (1759)	−1.6 (5682)	4.8 (8278)	7.5 (5981)	9.9 (3208)	12.2 (2240)	13.2 (543)	16.6 (168)	24.8 (82)
With national university or college student	2.8 (327)	−71.3 (17)	−16.5 (25)	−4.9 (50)	7.1 (73)	3.7 (76)	−0.9 (61)	12.9 (19)	5.0 (3)	24.2 (3)
With private university or college student	−4.1 (742)	−82.8 (12)	−15.0 (34)	−18.2 (102)	−5.5 (162)	−8.8 (167)	0.1 (171)	2.2 (69)	−3.1 (16)	16.8 (9)

Notes: The upper figures represent household saving rates. The lower figures (in parentheses) show the number of households sampled.

The yearly income groups are as follows:

1 Less than 400,000 yen
2 400,000~599,999 yen
3 600,000~799,999 yen
4 800,000~999,999 yen
5 1,000,000~1,199,999 yen
6 1,200,000~1,599,999 yen
7 1,600,000~1,999,999 yen
8 2,000,000~2,499,999 yen
9 2,500,00 yen or over

Source: Prime Minister's Office, Statistics Bureau (Sōrifu, Tōkei-kyoku), *Zenkoku Shōhi Jittai Chōsa Hōkoku* (Report on the National Survey of Family Income and Expenditure), 1969 edition (Tokyo: Zaidan Hōjin Nihon Tōkei Kyōkai, 1971), volume I, Tables 1 (pp. 52–55) and 25 (pp. 418–421).

are relatively unimportant.

The other type of data that can shed light on the impact of educational expenses is data on saving rates cross-tabulated by yearly income group and whether or not the household has a student in college or university. Such data are available for 1969 and 1979 in the NSFIE (see Tables 6 and 7 below). Looking first at the 1969 data in Table 6, it can be seen that, holding income constant, the saving rate is much lower for worker households which have a student in college or university than for all worker households and that the saving rate is especially low for households with a student in a private college or university, which is not surprising since tuition and other fees are much higher at private colleges and universities than at national and public colleges and universities. Moreover, as in the case of the data on saving rates by household composition and life-cycle stage, the differences in saving rates between households with and without a student in college or university are striking, with the saving rate being negative over a wide range for households with a student in college or university.[8)]

Table 7. The Household Saving Rate by Yearly Income and Whether or Not the Household Has a Student in College or University (1979 Data)

		Yearly income group								
	Average	1	2	3	4	5	6	7	8	9
All worker households	12.9 (33,728)	3.8 (119)	2.0 (253)	3.1 (673)	7.5 (2534)	10.0 (6757)	12.3 (7259)	13.3 (11,180)	15.7 (4559)	19.1 (393)
With national or public univ. or college student	0.7 (300)	−162.8 (2)	33.7 (2)	−48.1 (3)	−23.0 (5)	10.1 (30)	−2.5 (32)	1.2 (126)	6.3 (86)	−17.4 (15)
With private university or college student	0.0 (983)	−4.9 (2)	10.5 (2)	−2.6 (6)	−3.5 (11)	−5.0 (46)	−6.5 (89)	−2.6 (453)	2.3 (333)	6.5 (41)

Notes: The upper figures represent household saving rates. The lower figures (in parentheses) show the number of households sampled.

The yearly income groups are as follows:

1 Less than 1,000,000 yen
2 1,000,000~1,399,999 yen
3 1,400,000~1,799,999 yen
4 1,800,000~2,399,999 yen
5 2,400,000~3,199,999 yen
6 3,200,000~3,999,999 yen
7 4,000,000~5,999,999 yen
8 6,000,000~9,999,999 yen
9 10,000,000 yen or over

Source: Prime Minister's Office, Statistics Bureau (Sōrifu, Tōkei-kyoku), *Zenkoku Shōji Jittai Chōsa Hōkoku* (Report on the National Survey of Family Income and Expenditure), 1979 edition (Tokyo: Zaidan Hōjin Nihon Tōkei Kyōkai, 1981), volume 1, part 1, Table 1, pp. 86–91; volume 7, Tables 46 and 47, pp. 170–173.

8) For the same reason given earlier, the saving rate figures might not be negative if computed using data pertaining to the entire year.

Turning now to the 1979 data in Table 7, the data again show that the saving rate is, in general, much lower for worker households with a college or university student than it is for worker households as a whole, with the former often becoming negative. The comparison between households with a student in a national or public college or university and those with a student in a private college or university is less clear, but this is apparently due to the small number of observations in certain cells. For the four income groups with the greatest number of households with a college student (income groups 5 through 8, which account for 93 percent of households with a college student), the saving rate of households with a student in a private college or university is, without exception, significantly lower than that of households with a student in a national or public college or university.

It must be borne in mind that household characteristics other than income have not been controlled for in the above analysis, but nonetheless, the second type of data for both years confirms the earlier finding that households with a college student save far less than other households and often dissave. Moreover, the result that households with a student in a private college or university, where the tuition and other fees are far higher, have lower saving rates than households with a student in a national or public college or university suggests that the greater are the college-related expenditures of a household with a college student, the lower is its saving rate. Both findings underscore the importance of the impact of educational expenditures on the saving rate of households with college students.

To summarize the findings of this section, in Japan, education-related expenditures (especially those for college or university) constitute a major expense that must be financed partly by saving in advance, and thus such expenditures have a significant impact on the saving patterns of individual households, increasing the saving rates of households with elementary or junior high school students and decreasing the saving rates of households with high school or college students.

III The Impact of Saving for Education on the Aggregate Household Saving Rate

A. Introduction

In the previous section, I showed that educational expenditures have a significant impact on the saving patterns of individual households, but this does not necessarily imply that saving for education has a significant impact on the *aggregate* household saving rate. It is to the latter question that I turn in this section.

To begin with, I will attempt to calculate the aggregate saving target for each motive as a percent of the aggregate saving target for all motives. This calculation can be done by multiplying the average target for each motive (the first column of Table 4) by the percent of households saving for that motive (the second column of Table 4, which is reproduced from Table 3) and scaling the resulting products so that they sum to 100. The results, which are shown in the third column of Table 4, in-

dicate that the aggregate target for old age is by far the most important, accounting for a full 54 percent of the aggregate target for all motives. The other saving motives with significant aggregate targets—land/housing purchase, education, unexpected expenditures, and marriage—have aggregate targets which comprise 19, 12, 10, and 4 percent, respectively, of the aggregate target for all motives. (The aggregate targets for the remaining motives are of relatively little importance, with none accounting for more than one percent of the aggregate target for all motives.)[9] As shown in Table 4, saving for education is the second most important motive in terms of the percent of households saving for each motive, but because it is only fourth in terms of the average target amount, its overall rank is third, behind saving for old age and saving for land/housing purchase.

The foregoing findings suggest that saving for education is an important but not a dominant motive for saving, but there are several problems with the above figures. First, they refer to the target amount of saving for each motive and not to the amount of saving that is done in a given year for each motive. If one wishes to assess the contribution of saving for each motive to the total amount of household saving that is done in a given year (a flow concept), one should examine the amount (flow) of saving for each motive rather than the target amount. The two will not necessarily coincide because of differences in the time horizon for each motive. For example, the aggregate target amount for old age is the highest, as we saw earlier, but this motive is likely to have the longest time horizon because the household has until the household head's retirement to accumulate the desired amount. Thus, the amount of saving that the household will have to do every year in order to achieve its target for old age will not necessarily be very high, and the rank of this motive might be lower if it were ranked by the amount of saving for each motive rather than by the target amount. By contrast, the time horizon is likely to be relatively short in the case of saving for education, and thus the rank of this motive might be higher if it were ranked by the amount of saving for each motive rather than by the target amount. Unfortunately, however, no data are available on the time horizon for each motive, so it is not possible to convert the above figures on target amounts for each motive to figures on the amount of saving for each motive.

An additional problem with the above figures is that they ignore saving in the form of loan repayments. The data on target amounts cited above presumably indicate the amount which households wish to raise through saving and exclude the portion of planned expenditures for a given motive which they plan to finance through

9) Unfortunately, the aggregate target for future business capital could not be computed because data on the percent of households saving for business purposes were not available, but it is probably relatively low despite the high average target for this purpose because the percent of households saving for this purpose is presumably quite low. Similarly, the aggregate target for the payment of taxes could not be computed because data on the average target amount for this purpose were not available, but it is probably relatively low because the percent of households saving for this purpose is quite low and the average target amount for this purpose is also likely to be relatively low.

loans. They therefore reflect only ex ante saving even though ex post saving in the form of loan repayments also constitutes a form of saving. Thus, to the extent that reliance on loans differs from motive to motive, neglecting saving in the form of loan repayments will lead to biases in the rank ordering of the various motives. Since housing loans are the most readily available type of consumer loan, the rank of land/housing purchase might be higher if saving in the form of loan repayments were taken into account. Similarly, since loans are also available for education and consumer durables purchases, these motives might also move up in the standings if saving in the form of loan repayments were taken into account. Thus, correcting for the two problems identified thus far would probably increase the relative importance of saving for education.

The third and most serious problem with the above figures is that they disregard the dissaving of those realizing a given motive. In the case of education, for example, households with a pre-high school child will be saving for education, but households with a child currently in high school or college will be dissaving for the same purpose. In fact, *the aggregate amount of saving of the household sector as a whole for education and most other motives will be zero in a stationary economy because the saving of those saving for a given motive will be exactly offset by the dissaving of those realizing that motive*,[10] and moreover, this will be true regardless of how high is the saving of those saving for the motive in question.

The only motives for which the aggregate amount of saving will *not* be zero in a stationary economy are saving for land/housing purchase and that for consumer durable purchases. These motives involve the purchase of (investment in) real assets, which itself constitutes a form of saving, and consequently, the dissaving in the form of the decumulation of financial assets that occurs when the motive is realized (i.e., when the purchase is made) will be exactly offset by saving in the form of the accumulation of real assets.[11] Thus, the aggregate amount of saving for motives involving the purchase of real assets will invariably be positive (or at least non-negative), even in a stationary economy. Moreover, since education can be regarded as saving in the form of investment in human capital, it can be argued along similar lines that the aggregate amount of saving for education will be positive, even in a stationary economy.[12] Thus, correcting for the third problem will cause saving for land/housing purchase,

10) This is also noted by Sato (1982, p. 19). Modigliani (1966, p. 163) makes the same point with specific reference to saving for old age (life cycle saving): "in a stationary economy of constant population and productivity...the aggregate rate of saving would be zero as the positive saving of the younger households, in their accumulation phase, would be precisely offset by the dissaving of the retired households drawing down their earlier accumulation."

11) Note, however, that, since consumer durables purchases are classified as consumption rather than saving in the national income accounts, the national income account concept of household saving excludes saving in the form of consumer durables purchases; land/housing purchases are properly classified as saving, however.

12) Note, however, that expenditures on education are classified as consumption rather than saving in the national income accounts.

consumer durables purchases, and education to increase in relative importance; indeed, they will be the only motives for which the aggregate amount of saving is positive in the case of a stationary economy.

A final point, which is related to the problem just discussed, is that the aggregate amount of saving for *any* motive may be positive if the economy is *not* stationary—in particular, if (1) the population is growing, (2) the percent of the population saving for that motive is increasing, or (3) the target saving amount for that motive is increasing—because if one or more of these conditions is met, the saving of those saving for that motive will exceed the dissaving of those realizing that motive. The first two conditions will cause the number of households saving for the motive in question to exceed the number of households dissaving for that motive, while the third condition will cause the amount of saving per household saving for the motive in question to exceed the amount of dissaving per household realizing that motive.[13] In the case of education, all three of the above conditions were met during much of the postwar period in Japan: (1) the population was growing; (2) the college entrance rate was increasing rapidly, meaning that the percent of households saving for educational expenses was presumably also increasing commensurately; and (3) college education costs were increasing sharply, meaning that the target saving amount for education was presumably also increasing commensurately.[14] Thus, one would expect the aggregate amount of saving for education to have been positive even without treating educational expenditures as saving in the form of investment in human capital.

In sum, the data on the aggregate saving targets for each motive are not a good indicator of the contribution of saving for each motive to the aggregate household saving rate. In fact, the aggregate amount of saving for most motives and hence their contribution to the aggregate household saving rate will be zero in a stationary econ-

13) A fourth condition is that there be a shortening of the time horizon for the motive in question. If this occurs, those saving for that motive will have to increase their saving in order to accumulate the desired amount earlier, and this will cause the saving of those saving for that motive to exceed the dissaving of those realizing that motive. Thus, the aggregate amount of saving for that motive will be positive, even without the other three conditions being met. However, this condition is not examined in detail in this paper because no data are available on the time horizon for each motive and because sustained changes in the time horizon for a given motive are probably less likely to occur than sustained changes in the other three factors.

14) The first factor has been noted by Sato (1982, p. 19), the second factor by Economic Planning Agency (1978, p. 89) and Sato (1982, p. 19), and the third factor by Economic Planning Agency (1980, p. 201). With respect to the third factor, as noted by Economic Planning Agency (1980, p. 201), an increase in college education costs may have a negative impact on the college entrance rate, which in turn would tend to reduce the aggregate amount of education-related saving. However, in the case of postwar Japan, the college entrance rate has continued to increase despite the rapid increase in college education costs, presumably because the demand for higher education is price-inelastic and/or because there have been other offsetting factors (for example, the increase in the college entrance rate induced by the rapid growth of real per capita household incomes may have more than offset the decline in the college entrance rate induced by the rapid growth of college education costs). An analysis of these interrelationships is beyond the scope of this paper.

omy, regardless of how high the aggregate saving targets for those motives are. In the case of education, however, one would expect the aggregate amount of saving to have been positive not only because educational expenditures constitute saving in the form of investment in human capital but also because the Japanese economy diverged widely from a stationary state with respect to variables relating to education, as a result of which the saving of those saving for education should have exceeded the dissaving of those dissaving for education. The remainder of this section represents an attempt to estimate the aggregate amount of education-related saving in the case of postwar Japan.[15]

B. Methodology

In this subsection, I describe the methodology used to calculate the aggregate amount of education-related saving. Because no direct data are available, I have had to estimate the amount of education-related saving indirectly using data on population, education costs, college entrance rates, and interest rates. I have confined the analysis to saving for college education expenses because of data limitations and also because it was felt that saving for college education expenses are probably the dominant component of education-related saving. In order to simplify the calculations, I adopted the following assumptions:

(1) Households have perfect foresight about whether their children will attend a two-year junior college, a four-year university, or neither.

(2) Households with children who will attend college begin saving for this purpose after their child enters junior high school (i.e., after he or she attains the age of twelve).[16]

(3) Households with children who will attend a four-year university save one-tenth of the present value of the expected family contribution toward the cost of their child or children's education each year.

(4) Households with children who will attend a two-year junior college save one-eighth of the present value of the expected family contribution each year.

15) A similar analysis is conducted by Horie (1985, pp. 64–75). In essence, Horie calculates the amount of financial saving for each motive on the assumption that the amount of financial saving for a given motive will reflect changes in the prices of goods and services whose purchase is the ultimate objective of that motive. He does not explicitly take account of dissaving for each motive, and moreover, he does not analyze saving for education separately but rather groups it together with saving for all other non-durable consumption expenditures.

16) I made this assumption for the following reasons: First, as the data presented in Section II showed, Japanese households apparently save the most intensively for their children's educational expenses when their children are in junior high school and, second, Japanese housewives with whom I spoke informally stated that they began thinking about their children's college education expenses when their children entered junior high school. Recall, however, that the data presented in Section II showed that households with children in elementary school are also apparently saving for their children's educational expenses. I therefore tried varying this assumption and found that the aggregate amount of education-related saving was higher, the earlier households are assumed to start saving for their children's college education expenses.

(5) All students who enter junior college or university do so at age 18. (In reality, a substantial proportion of students are *older* because they failed the entrance examinations at the college(s) of their choice the first time and spent a year or more as "rōnin" (literally, masterless samurai) preparing to take the examinations again. However, almost no students are less than 18 because students are generally not allowed to skip grades in Japan.)

(6) No students drop out from junior college or university before graduation. (In reality, there are some who do, but the number is relatively small.)

(7) All students complete junior college in two years and university in four years. (In fact, a significant number remain in university for five or more years.)

(8) Households do not make use of educational loans.

Note that the above assumptions (especially (2), (3), (4), and (5)) ensure that the full amount of the expected family contribution will have been accumulated by the child's final year in junior college or university. Note also that I assume that households set aside the same fraction of the present value of the expected family contribution to their child's college education costs during each of the six years prior to their child's entrance into college as well as during each of the two or four years that the child is in college. In other words, I assume, in effect, that the parents of four-year university (two-year junior college) students save three-fifths (three-quarters) of the family contribution in advance and finance the remaining two-fifths (one-quarter) out of current income. However, for computational convenience, I will assume that the two-fifths (one-fourth) of the family contribution that is financed out of current income is saved and then immediately dissaved; thus, it will be included in both education-related saving as well as in education-related dissaving, meaning that it will cancel out if the difference between the two is taken.

Reflecting these simplifying assumptions, the formula for the aggregate amount of education-related saving of the household sector as a whole in year t and the formula for the aggregate amount of education-related dissaving are as follows:

$$(1)\qquad S_t^E = \frac{1}{10}\sum_{a=12}^{21} n_{a,t} R_{t+18-a}^U \sum_{s=18}^{21} E_t^U \left[\frac{(1+g_t^U)}{(1+r_t)}\right]^{(s-a)} + \frac{1}{8}\sum_{a=12}^{19} n_{a,t} R_{t+18+a}^{JC} \sum_{s=18}^{19} E_t^{JC} \left[\frac{(1+g_t^{JC})}{(1+r_t)}\right]^{(s-a)}$$

$$(2)\qquad DS_t^E = \sum_{a=18}^{21} n_{a,t} R_{t+18-a}^U E_t^U + \sum_{a=18}^{19} n_{a,t} R_{t+18-a}^{JC} E_t^{JC}$$

where S_t^E = the aggregate amount of education-related saving in year t
DS_t^E = the aggregate amount of education-related dissaving in year t
a = an age index
$n_{a,t}$ = the population aged a years in year t
R_t^U = the percent of the 18-year-old population going on to four-year colleges and universities in year t
R_t^{JC} = the percent of the 18-year-old population going on to two-year junior

colleges in year t

E_t^U = the family contribution paid to students in four-year colleges and universities in year t (annual amount)

E_t^{JC} = the family contribution paid to students in two-year junior colleges in year t (annual amount)

g_t^U = the expected growth rate of E_t^U

g_t^{JC} = the expected growth rate of E_t^{JC}

r_t = the expected interest rate

Furthermore, the net amount of aggregate education-related saving in year t (NS_t^E) is defined as

$$(3) \qquad NS_t^E = S_t^E - DS_t^E$$

This variable excludes saving in the form of investment in human capital and hence can be regarded as the aggregate amount of net *financial* education-related saving. Because expenditures on education are usually not classified as a form of saving and because, in particular, the national income accounts definition of saving excludes expenditures on education, I will initially disregard the fact that expenditures on education can be regarded as a form of saving and focus on the amount of net financial saving for education.

Note that equations (1), (2), and (3) corroborate my earlier contention that net financial saving for education would be zero in a stationary economy. In particular, if (1) population growth were zero, meaning that all the n_a's were equal, (2) the college entrance rates, R^U and R^{JC}, were constant over time, and (3) the expected growth rates of the family contribution to education costs, g^U and g^{JC}, were both always equal to the expected interest rate, r, S^E and DS^E would be exactly equal to one another (both would equal $4\bar{n}_a\bar{R}^U E_t^U + 2\bar{n}_a\bar{R}^{JC}E_t^{JC}$, where a bar over a variable name indicates a constant value for that variable), and hence net financial saving for education, NS^E, would be exactly zero. However, population growth, increases in the college entrance rate, and/or a growth rate of the family contribution to education costs in excess of the interest rate (combined with a price-inelastic demand for education)[17] would cause S^E to exceed DS^E, making NS^E positive.

Note also that high *levels* of the college entrance rates, R^U and R^{JC}, and of the family contribution to education costs, E^U and E^{JC}, would not, by themselves, be sufficient to cause the amount of net financial saving for education to become positive, but if it were *already* positive due to one or more of the aforementioned stationarity condi-

17) As noted earlier (see footnote 14), this condition is required because, otherwise, an increase in education costs would induce a decline in the demand for education (in particular, a decline in the college entrance rate), which would work at cross purposes with the increase in the target amount of saving for education that would be induced by the increase in education costs, with the former tending to cause the amount of net financial saving for education to become negative and the latter tending to cause it to become positive.

tions being violated, the levels of R^U, R^{JC}, E^U, and E^{JC} *would* have a positive impact on the amount thereof.[18]

C. The Data

In this subsection, I describe the data to be used to calculate the amount of net financial saving for education. All of the data are on a fiscal year (academic year) basis (April 1 to March 31 in the case of Japan).

Data on the population by single years of age, n_a, were taken from the sources indicated in Table 8. Since all of the sources used provide figures as of October 1, it was necessary to convert them to figures as of April 1. This was done by averaging the population aged a years and the population aged $a+1$ years on October 1 of the same year.[19]

Data on the family contribution to college education costs, E^U and E^{JC}, were taken from Table 2 (refer to this table for a description of the data and of the data source). As the survey from which these data were taken is conducted only biannually, I have interpolated in order to obtain figures for years in which no survey was conducted (I assume a constant rate of growth of education costs between consecutive surveys in order to perform this interpolation). Moreover, because no data were available for junior college students for 1966, I assumed that the rate of increase of E^{JC} between 1966 and 1968 was the same as that of E^U in order to obtain an estimate of E^{JC} in 1966.

The expected growth rate of E^U and E^{JC}, g^U and g^{JC}, were calculated on the basis of a very naive assumption concerning the formation of expectations—namely, that the expected growth rate is equal to the average rate of growth during the immediately preceding two-year period. I also tried using the growth rate during the immediately

18) Equations (1) and (2) indicate that the *level* of the n_a's (the population at each age) will also have an impact on the amount of net financial saving for education (assuming that it is already either positive or negative). In particular, the higher is the population at the age at which parents save for their children's college education costs (12 to 21 in the case of four-year universities and 12 to 19 in the case of junior colleges), the higher will be the amount of (gross) saving for education, while the higher is the college-age population (18 to 21 in the case of four-year universities and 18 to 19 in the case of two-year junior colleges), the higher will be the amount of dissaving for education. Since the amount of net financial saving for education is the difference between the two, it can be shown that, if the amount of net financial saving for education is already positive, it will be greater, the higher is the population aged 12 to 17 and the lower is the population aged 18 to 21 (in the case of four-year universities) or 18 to 19 (in the case of two-year junior colleges). If one is interested in education-related saving as a proportion of total household saving or of total household disposable income, both of these will be higher, the higher is the ratio of the population aged 12 to 17 to the total population and the lower is the ratio of the population aged 18 to 21 (18 to 19) to the total population. Both ratios are probably high by international standards in Japan, so it is not clear a priori whether the amount of net financial saving for education in Japan will be higher or lower than in other countries. It will not be possible to analyze this factor in detail in this paper because of the unavailability of international data on population by single years of age (the United Nations publishes data by five-year age groups only).

19) The alternative would have been to average the population aged a-1 years on October 1 of the previous year and the population aged a years on October 1 of the same year.

preceding year but found that the results were not significantly affected.

Data on the college entrance rate were taken from Table 9 (refer to this table for a description of the data and of the data source). Households were assumed to have perfect foresight concerning future college entrance rates, as noted earlier, but because data for 1983 were the most recent figures available at the time the calculations were done, I assumed that the college entrance rates would remain at 1983 levels for the indefinite future. This assumption is probably not unreasonable because the college entrance rates in Japan have remained roughly constant in recent years, as Table 9 shows.

Data on the interest rate, r, were taken from the source indicated in Table 2 (Table 2 presents data for alternate years). The expected interest rate was assumed to equal the two-year average of daily rates during the current and previous fiscal years. Thus, the same naive assumption concerning the formation of expectations was used for both g^U and g^{JC} and r. I also tried using a constant interest rate as well as the average interest rate during the current fiscal year but found that the results were not significantly affected.

Finally, national income accounts data on household saving and household disposable income were taken from Economic Planning Agency (1983, Account 5, pp. 34–35, and 1985, Account 5, pp. 16–17). The amount of net financial saving for education was compared to these variables in order to obtain an indication of the relative magnitude thereof.

I now examine the data on each variable in order to verify my earlier contention that conditions in Japan during the postwar period were such that one would expect the amount of net financial saving for education to have been positive.

(1) Population growth. Looking first at the impact of population growth, Table 8 shows the ratio between the number of individuals at the age at which their parents save for their college education costs and the number of individuals who are of college age. In accordance with the assumptions that I made in the previous section (e.g., that parents begin saving for their children's college education costs when their children attain the age of 12), the relevant ratio in the case of four-year universities is that between the population aged 12 to 21 and the population aged 18 to 21, while in the case of two-year junior colleges, the relevant ratio is that between the population aged 12 to 19 and the population aged 18 to 19. If the population were stationary, the first ratio would equal $10/4=2.5$ while the second ratio would equal $8/2=4$. The extent to which the actual ratios exceed or fall short of these values provides a measure of the impact of population growth on the amount of education-related saving.

As can be seen from Table 8, both ratios were above their critical levels for the first two-thirds of the twentieth century and were especially high in about 1965 but fell below their critical levels in 1966 or 1967. The ratios bottomed out in 1968 or 1969 and have generally been increasing ever since, rising back above their critical levels in 1975 or 1976. The above ratios were consistently above their critical levels

Table 8. Changes in Population Structure

Year (as of October 1)	Population Aged 12–21 / Population Aged 18–21	Population Aged 12–19 / Population Aged 18–19
1920	2.66	4.14
1930	2.62	4.13
1940	2.78	4.42
1947	2.64	4.22
1950	2.60	4.10
1955	2.58	4.08
1958	2.62	4.28
1959	2.62	4.04
1960	2.65	3.93
1965	2.79	4.44
1966	2.57	3.58
1967	2.32	3.34
1968	2.15	3.31
1969	2.12	3.40
1970	2.17	3.53
1971	2.23	3.62
1972	2.24	3.63
1973	2.39	3.80
1974	2.39	3.85
1975	2.48	4.05
1976	2.51	4.11
1977	2.56	4.08
1978	2.54	4.02
1979	2.57	4.16
1980	2.62	4.25
1981	2.65	4.26
1982	2.66	4.24
1983	2.63	4.15
1984	2.76	4.56

Note: All figures exclude foreigners.

Sources: For census years (generally years that are multiples of five): Kokusei Chōsa (Census of Population), the results of which are presented in Management and Coordination Agency, Statistics Bureau (Sōmu-chō, Tōkei-kyoku) (formerly, Prime Minister's Office, Statistics Bureau (Sōrifu, Tōkei-kyoku), ed., *Nihon Tōkei Nenkan* (Japan Statistical Yearbook) (Tokyo: Zaidan-hōjin Nihon Tōkei Kyōkai and Mainichi Shinbun-sha, annual), various issues.

For other years: The "Suikei Jinkō" (Estimated Population) figures, which are published in the same source as above and in the *Jinkō Suikei Geppō* (The Population Estimate Monthly), issued by the Management and Coordination Agency, Statistics Bureau, Research Department, Manpower Statistics

Section (Sōmu-chō, Tōkei-kyoku, Chōsa-bu, Rōdō-ryoku Tōkei-ka), which was formerly part of the Prime Minister's Office (Sōrifu).

during the earlier period as a result of the relatively high birth rates that continued throughout the prewar and early war years, but the more recent trends are in large part a result of the aging of the postwar baby boom generation, which was born between 1947 and 1949. Since I assume that parents begin saving for their children's college education costs when their children attain the age of 12, the parents of the baby boom generation began saving for their children's college education costs in 1959–61, and this may explain why both ratios were unusually high in about 1965. Moreover, the baby boom generation began reaching college age after 1965 and were responsible for a swelling of the college-age population that lasted until 1968 for junior colleges and 1970 for four-year universities. Thus, the attainment of college age of the baby boom generation can explain the sharp drop in the above ratios below their critical levels between 1965 and 1968 (in the case of junior colleges) and between 1965 and 1969 (in the case of four-year universities).

More recently, the birth rate declined sharply in 1966 due to the fac. that it was considered an extremely unlucky year for girls to be born in, but increased again in 1967 and remained high for several years thereafter, until about 1974 (those born during this period have been referred to as the "second postwar baby boom generation"). Since those born in 1966 attained the age of 12 in 1978, the drop in the birth rate in 1966 can explain the dip in the above ratios in 1978. Moreover, since the second postwar baby boom generation began attaining the age of 12 in 1979, the second postwar baby boom can explain why the above ratios show an increase beginning in 1979. Finally, the above ratios show a temporary increase in 1984 because those born in 1966 attained college age in 1984, resulting in a temporary decline in the college-age population, while both ratios would be expected to decline beginning in 1985 because of the attainment of college age of the second postwar baby boom generation.[20]

In sum, the ratio between the number of individuals at the age at which their parents save for their college education and the number of individuals who are of college age has shown considerable volatility, with most of the fluctuations since 1960 being explicable by the aging of the two baby boom generations. As this ratio was above its critical level until 1965 or 1966 and again beginning in 1975 or 1976, we would expect population growth to have tended to cause the amount of net financial saving for education to be positive during these years. However, as the above ratio was below its critical level during the intervening period, we would expect population growth to have tended to cause the amount of net financial saving for education to be *negative* during this period.

(2) The increase of the college entrance rate. Data on movements over time in

20) In fact, national as well as private universities in Japan are planning to temporarily increase the number of students admitted between 1986 and 1992 in order to accomodate the temporary swelling of the college-age population.

Table 9. Trends in the College Entrance Rate in Japan

Academic Year	Combined	Four-Year Universities	Two-Year Junior Colleges
1954	10.1%	8.0%	2.1%
1955	10.1	7.9	2.2
1956	9.8	7.7	2.1
1957	11.2	9.0	2.2
1958	10.7	8.6	2.1
1959	10.1	8.1	2.0
1960	10.3	8.2	2.1
1961	11.8	9.3	2.5
1962	12.8	10.0	2.8
1963	15.4	11.9	3.5
1964	19.9	15.5	4.4
1965	17.0	12.8	4.1
1966	16.1	11.8	4.3
1967	17.9	12.9	5.0
1968	19.2	13.8	5.4
1969	21.4	15.4	6.0
1970	23.6	17.1	6.5
1971	26.8	19.4	7.4
1972	29.8	21.6	8.2
1973	32.2	23.0	9.2
1974	34.7	24.7	10.0
1975	37.8	26.7	11.0
1976	38.6	27.3	11.3
1977	37.7	26.4	11.3
1978	38.4	26.9	11.5
1979	37.4	26.1	11.3
1980	37.4	26.1	11.3
1981	36.9	25.7	11.1
1982	36.3	25.3	11.0
1983	35.1	24.4	10.7
1984	35.6	24.8	10.8

Notes: The entrance rate for four-year universities is defined as the ratio of the number of individuals entering the undergraduate division of four-year universities in April of a particular year to the number of individuals graduating from junior high school three years earlier. The numerator includes *rōnin* (those entering university one or more years after graduation from high school) but excludes those entering the correspondence education division of universities. Since graduation from junior high school is compulsory in Japan, virtually 100 percent of the school-age population graduates from junior high school; thus, the above rate can also be interpreted as the percent of the college-age population advancing to four-year universities.

The entrance rate for two-year junior colleges refers to those advancing to the main division (*honka*) of two-year junior colleges and is defined similarly.

Source: The Gakkō Kihon Chōsa (The Basic Survey of Schools), conducted by the Ministry of Education (Monbushō), the results of which are presented in: Ministry of Education, Minister's Secretariat, Research and Statistics Section (Monbushō, Daijin Kanbō, Chōsa Tōkei-ka), ed., *Monbu Tōkei Yōran* (Handbook of Statistics on Education), 1985 edition (Tokyo: Dai-ichi Hōki Shuppan Kabushiki-kaisha, 1985), pp. 34–35, p. 60; pp. 28–29, pp. 34–35 of the 1984 edition of the same; and Table 3, pp. 140–141, and Table 8, pp. 152–153, of the 1983 edition of the same.

the overall college entrance rate and in the entrance rates for four-year universities and two-year junior colleges separately are shown in Table 9. As this table shows, all three rates increased sharply between the 1950's and the mid–1970's: the entrance rate for four-year universities rose from a low of 7.7 percent in 1956 to a high of 27.3 percent in 1976, that for two-year junior colleges from a low of 2.0 percent in 1959 to a high of 11.5 percent in 1978, and that for universities and junior colleges combined from a low of 9.8 percent in 1956 to a high of 38.6 percent in 1976.[21] The only major exceptions are the 1957–59 and 1964–66 periods, during which there was a slight decline in all three entrance rates. Since about 1976, all three entrance rates have leveled off or declined slightly, but they are still at relatively high levels, and moreover, part of the decline reflects the increasing popularity of technical schools and other types of schools which are not included in the above statistics.

It is said that the speed with which the college entrance rate increased in Japan (nearly quadrupling in a mere twenty years, from 9.8 percent in 1956 to 38.6 percent in 1976 in the case of the combined rate) has no precedent anywhere in the world, and this rapid increase in the college entrance rate should have tended to cause the amount of net financial saving for education to be positive. However, the college entrance rate has leveled off since 1976 and is therefore no longer a factor that would be expected to bring about a positive amount of net financial saving for education.

As for the *level* of Japan's college entrance rate, it has been in the 35 to 38 percent range in recent years, which is much higher than that of West Germany (19.4 percent in 1979), the United Kingdom (22.1 percent in 1977), and France (26.4 percent in 1980). The only major country with a higher college entrance rate is the United States (45.5 to 50.7 percent in 1981). (All figures on other countries are from

21) An examination of why the college entrance rate rose so rapidly in the case of Japan is beyond the scope of the present work, but this phenomenon is probably due, to a large extent, to the rapid increases in real household incomes during the high-growth era. If the demand for higher education were income-elastic, increases in income would be expected to increase the demand for higher education, one manifestation of which would be an increase in the college entrance rate. This hypothesis is supported by the fact that the college entrance rate increased the most rapidly during the high growth era (lasting from the 1950's to the early 1970's) and leveled off or declined slightly after Japan entered the post-oil crisis era of "stable" growth.

the Ministry of Education, Minister's Secretariat, Research and Statistics Section (1983, Table 1(3), p. 325).) Thus, Japan's college entrance rate is one of the highest in the world, and its high level would be expected to increase the amount of net financial saving for education in Japan (assuming that it was positive to begin with).

(3) The growth of the family contribution to college education costs. Table 2, which was discussed briefly in Section II, presents data on the total education costs of university and junior college students in Japan as well as on the portion of these costs that are financed by family contributions.[22] As this table shows, the rate of increase of the family contribution to college education costs exceeded the interest rate in every year for which data are available in the case of four-year universities, with the difference being substantial in many cases. Moreover, in the case of junior colleges, the rate of increase of the family contribution to college education costs fell slightly short of the interest rate in three cases but substantially exceeded the interest rate in the remaining four cases. Looking at trends over time, the rate of increase of the family contribution to college education costs was highest during the 1966–68 and 1972–76 periods. During these periods, the rate of increase was 15 percent or higher and exceeded the interest rate by more than ten percentage points. Thus, assuming that increases in college education costs did not have an adverse impact on the college entrance rate, the increase of the family contribution to college education costs at rates in excess of the interest rate should have tended to cause the amount of net financial saving for education to be positive throughout the 1966–82 period but especially during the 1966–68 and 1972–76 periods.[23]

22) The portion of college education costs *not* financed by family contributions is financed by scholarships, the earnings of students from part-time and regular employment, etc. Thus, it is primarily the family contribution portion of college education costs that must be accumulated in advance and it is therefore this portion upon which we focus.

23) An analysis of the reasons for the rapid increase of the family contribution to college education costs is beyond the scope of this paper, but note that, since the family contribution to college education costs is the product of the family contribution ratio and total college education costs, the rate of increase thereof will be the sum of the rate of increase of the family contribution ratio and that of total college education costs. Data on both of these factors are shown in Table 2, and as the table shows, total education costs increased throughout the 1966–82 period at fairly rapid rates (5 to 20 percent per year) for both four-year universities and two-year junior colleges, but trends over time in the family contribution ratio are less clear: this ratio increased between 1966–68, decreased between 1968–74, and increased again between 1974–82 (except for a slight decline between 1978–80) for both four-year universities and two-year junior colleges. However, because the range of variation in the family contribution ratio was small relative to the rate of increase in total education costs, the family contribution to education costs increased throughout the 1966–82 period and, moreover, increased at roughly the same rate as total education costs for both four-year universities and two-year junior colleges, as shown in Table 2.

As for why total education costs increased so rapidly, at least two explanations are possible: First, the "price" of a college education may have increased due either to demand side factors (such as an increased demand for higher education in the form of a higher college entrance rate) or supply side factors (such as an increase in the level of labor, fuel, and other costs facing colleges and universities or cuts in government subsidies thereto), and second, there may have been a change in the distribution of students among private, public, and national universities, a change in their distribution by commuting class, etc. (recall that the college education cost figures used represent a weighted average of all groups). My guess is that the first factor was of far greater importance.

As for the *level* of the family contribution to college education costs, I concluded in Section II that it is probably higher in Japan than in the United States. Data for other countries are unfortunately not available, but if it were true that the level of the family contribution to college education costs were high by international standards in Japan, its high level would be expected to increase the amount of net financial saving for education (assuming it were positive to begin with).

In sum, I have shown that both the college entrance rate and the family contribution to college education costs were increasing rapidly in Japan during most of the period under consideration, and both factors should have contributed toward bringing about a positive amount of net financial saving for education. Moreover, the high *levels* of the college entrance rate and (possibly) of the family contribution to college education costs in Japan should have had a positive impact on the amount of net financial saving for education (assuming it was positive to begin with). As for changes in the age structure of the population, they should have tended to cause the amount of net financial saving for education to be positive prior to 1965 or 1966 and after 1975 or 1976 but should have tended to cause it to be negative during the intervening period. On balance, net financial saving for education should definitely have been positive and significant before 1965 and after 1976 and should have been positive during the 1965–76 period as well unless the impact of changes in the age structure of the population more than offset the impact of the growth of the college entrance rate and of the family contribution to college education costs.

D. The Results

I performed the calculations described in subsection B using a FORTRAN program and the data described in subsection C. The results, which are shown in Tables 10 and 11, indicate that the aggregate amount of net financial saving for education was, as expected, positive throughout the 1968–82 period in Japan.[24] However, the amount thereof was relatively small, averaging only 0.24 percent of household disposable income (range: 0.04 to 0.62 percent) and 1.27 percent of household saving (range: 0.22 to 3.87 percent) during the period as a whole. The aggregate amount of (gross) saving for education was considerably higher, averaging 1.16 percent of household disposable income (range: 0.97 to 1.57 percent) and 6.14 percent of household saving (range: 5.01 to 9.71 percent), but it was offset by almost as high a level of dissaving for education, averaging 0.92 percent of household disposable income (range: 0.80 to 1.06 percent) and 4.87 percent of household saving (range: 3.45 to 6.23 percent).

The foregoing results pertain to the standard case, in which households are assumed to begin saving for their children's college education costs when their children enter junior high school (i.e., attain the age of 12) and in which two-year averages are used as proxies for the expected levels of g^U, g^{JC}, and r. A number of other variants

24) As explained later, the necessary data were available only for this period.

Table 10. The Amount of Education-related Saving
(Ratios to Household Saving)

Fiscal Year	Aggregate amount of saving for education	Aggregate amount of dissaving for education	Aggregate amount of net financial saving for education
1968	9.71	5.84	3.87
1969	7.73	5.55	2.18
1970	5.64	4.65	0.99
1971	5.98	5.04	0.94
1972	5.41	4.64	0.77
1973	5.21	3.95	1.26
1974	5.01	3.45	1.56
1975	5.41	?.87	1.54
1976	6.11	4.38	1.73
1977	5.71	4.51	1.19
1978	5.93	5.14	0.79
1979	5.93	5.35	0.58
1980	5.33	5.11	0.22
1981	5.68	5.26	0.43
1982	7.25	6.23	1.03
Average	6.14	4.87	1.27

Note: All figures represent percentages of aggregate household saving. Refer to the text for a description of the calculation procedure and data sources.

were also tried but were generally found to yield similar results. For example, in the variant in which concurrent g^U, g^{JC}, and r were used in place of two-year averages as proxies for the expected levels of these variables, the amount of net financial saving for education was found to comprise an average of 0.23 percent of household disposable income (range: 0.02 to 0.62 percent) and 1.23 percent of household saving (range: 0.09 to 3.86 percent).

However, in the variant in which parents were assumed to begin saving for their children's college education expenses when their children enter senior high school (i.e., attain age 15) rather than when they enter junior high school (i.e., attain age 12), the amount of net financial saving for education was found to be considerably lower, averaging only 0.12 percent of household disposable income (range: 0.02 to 0.28 percent) and 0.61 percent of household saving (range: 0.12 to 1.71 percent).

Turning next to trends over time in the amount of saving for education, the aggregate amount of (gross) saving for education was highest in 1968, the first year of the period under study, declined until 1972 or 1974, increased until 1976, declined again until 1980, and began increasing again after 1980 (the lowest level was attained in 1974 in the case of ratios to household saving and in 1972 in the case of ratios to household disposable income). As for the aggregate amount of dissaving for educa-

Table 11. The Amount of Education-related Saving
(Ratios to Household Disposable Income)

Fiscal Year	Aggregate amount of saving for education	Aggregate amount of dissaving for education	Aggregate amount of net financial saving for education	Household saving rate (1)*	Household saving rate (2)**
1968	1.57	0.94	0.62	18.6	16.1
1969	1.29	0.93	0.36	19.2	16.7
1970	1.05	0.87	0.18	20.3	18.6
1971	1.03	0.87	0.16	20.1	17.2
1972	0.97	0.83	0.14	21.6	17.8
1973	1.07	0.81	0.26	22.5	20.6
1974	1.16	0.80	0.36	24.2	23.1
1975	1.20	0.86	0.34	23.0	22.2
1976	1.30	0.93	0.37	22.6	21.3
1977	1.21	0.96	0.25	22.8	21.2
1978	1.15	1.00	0.15	23.0	19.4
1979	1.10	0.99	0.11	22.4	18.5
1980	1.02	0.97	0.04	22.1	19.1
1981	1.09	1.01	0.08	20.8	19.2
1982	1.23	1.06	0.18	20.7	17.1
Average	1.16	0.92	0.24	21.6	19.2

Note: All figures represent percentages of household disposable income.
Refer to the text for a description of the calculation method and data sources for the first three columns.

* Based on data from the Prime Minister's Office, Statistics Bureau (Sōrifu, Tōkei-kyoku), *Kakei Chōsa Nenpō* (Annual Report on the Family Income and Expenditure Survey), 1982 edition (Tokyo: Zaidan-hōjin Nihon Tōkei Kyōkai, 1983), Table 1, p. 95, and the corresponding table of earlier editions. The figures represent calendar year data for worker households only.

** Based on national income accounts data for the household sector including individual enterprises. Refer to the text for the data source.

tion, it showed a downward trend until 1974, hitting its lowest level in that year, and showed an upward trend thereafter, hitting its highest level in 1982, the final year of the period under study.[25] Finally, the aggregate amount of net financial saving for education, which equals the difference between the two series just discussed, was highest in 1968, the first year of the period under study, declined until 1972, increased until 1976, declined again until 1980 (hitting its lowest level in that year), and then began increasing again after 1980. Thus, trends therein are very similar to trends in the aggregate amount of (gross) saving for education, presumably because trends in the

25) Reassuringly, these are the same trends observed in educational expenditures as a percent of total consumption expenditures (see Table 1) and in total college education costs per student and the family contribution thereto as a percent of per capita household disposable income (see Table 2).

amount of (gross) saving for education dominated trends in the amount of dissaving therefor.

Next, I compare trends over time in the aggregate amount of net financial saving for education as a ratio of aggregate household disposable income to trends over time in the aggregate household saving rate (refer to Table 11). Since the aggregate household saving rate showed an upward trend until 1974 and a downward trend thereafter, the two series moved roughly in parallel during the 1972–80 period, first rising and then falling, but the amount of net financial saving for education peaked somewhat later (1976 instead of 1974), and moreover, the two series moved in opposite directions during the 1968–72 and 1980–82 periods. Thus, movements over time in the aggregate amount of net financial saving for education can explain movements over time in the aggregated household saving rate to only a limited extent. In fact, the two series moved in opposite directions about half the time.

In sum, even though the aggregate amount of net financial saving for education has been positive, as expected, it has constituted only a small proportion of total household saving, and moreover, it can explain movements over time in the overall household saving rate to only a limited extent. Thus, education-related saving is apparently of relatively little importance as far as its impact on the aggregate household saving rate is concerned.

It should be noted, however, that there may be a margin of error in my calculations because of the simplifying assumptions I was forced to make. Moreover, the aforementioned figures may be underestimates because they reflect only saving for college education expenses and exclude saving for (1) primary and secondary education expenses; (2) the expenses of supplementary education ("prep schools," or, in Japanese, *juku* or *yobikō*) and private tutoring (*katei-kyōshi*), which have become so important in recent years, especially in connection with high school and university entrance examinations; (3) the expenses of technical schools, vocational schools, and other types of non-traditional post-secondary institutions, which have blossomed in recent years; and (4) the expenses of graduate school. (The contribution of parents to the latter, however, is often relatively low.)

In addition, because data on the family contribution to college education costs are not available on a continuing and consistent basis prior to 1966, I have had to confine my analysis to the 1968–82 period. This will further increase the downward bias in my estimates of the importance of education-related saving because it is during the pre-1968 period that we would expect the amount of net financial saving for education to have been the highest due to rapid increases in the college entrance rate and the high level of education-related saving of the parents of the first postwar baby boom generation.

Finally, as noted earlier, a further downward bias was introduced by ignoring the fact that expenditures on education can be regarded as saving in the form of investment in human capital. Even though financial assets are drawn down when educational expenses are incurred, this financial dissaving will be offset by saving in the form of

investment in human capital. Moreover, if this offset were exact, there would be no need to subtract dissaving for education from gross education-related saving in order to arrive at the amount of education-related saving of the household sector as a whole, and as shown earlier, the gross amount of education-related saving is far greater than the net amount.

The problem, however, is that the above conclusion requires the assumption that the amount of investment in human capital is exactly equal to the amount of (financial) dissaving for education. The latter (which equals the total amount of family contributions to education costs, according to our assumptions) is unlikely to be an accurate proxy for the former for several reasons. First, it will be upward biased because it includes not only the portion of the family contribution to college students that is used to finance tuition and other fees but also the portion that is used to finance the student's living expenses. Second, it will be downward biased because it excludes college education costs that are financed by sources other than family contributions (such as scholarships, educational loans, income from part-time and regular employment earned by the student, etc.). Third, it will be downward biased because it excludes subsidies from the government to national, public, and private universities, one consequence of which is that tuition and other fees do not fully reflect the true cost of a college education. Fourth, it will be downward biased because it excludes earnings foregone by college students (these are included in investment through education by Kendrick (1976) and others). Fifth, it will be upward biased because the depreciation of the existing stock of human capital has not been taken into account. Thus, there are at least five biases in my proxy for the amount of investment in human capital, two upward and three downward. The direction of the net bias cannot be determined a priori.

The immediately preceding discussion pertains to a retrospective measure of investment in human capital, which is based on education costs incurred (including foregone earnings), but Jorgenson and Pachon (1983) employ an altogether different measure that is prospective rather than retrospective. In essence, they calculate the amount of investment in human capital resulting from a year of education as the increase in the individual's lifetime labor income net of tuition and fees incurred. They find that the estimated amount of investment in human capital is far, far greater when measured using this methodology than it is when measured retrospectively.

Thus, there are various problems with the measurement of investment in human capital, but if it could be accurately measured and included in education-related saving, the estimated amount of the latter might far exceed even the gross estimates obtained in this paper. It should be noted, however, that since the national income accounts concept of saving does not include saving in the form of investment in human capital, a high level of saving of this form does not constitute an explanation of why Japan's household saving rate as defined in the national income accounts (or as defined in the Family Income and Expenditure Survey and other household surveys) is so high by international standards. To put it another way, the net financial saving for education

concept used in this paper is the correct measure of the contribution of education-related saving to the *measured* aggregate household saving rate.

E. Simulation Analysis

Finally, I report the results of a series of simulation exercises that were conducted with the purpose of assessing the level of, and trends over time in, the contribution of each of the various factors to the amount of education-related saving. These exercises will allow me to explain movements over time in the amount of net financial saving for education.

As noted earlier, the amount of net financial saving for education will be influenced by (1) population growth, (2) the increase of the college entrance rate, and (3) the growth rate of the family contribution to education costs. The contribution of each of these factors was estimated by means of the following simulations:

(1) In order to estimate the impact of the increase in the college entrance rate, I calculated what the amount of net financial saving for education would have been in each year if the college entrance rate had been equal to the current rate in the past and was expected to remain at the same level in the future as well. I then calculated the difference between this amount and the actual amount of net financial saving for education and interpreted the difference as a measure of the impact of the increase in the college entrance rate.

(2) In order to estimate the impact of the growth rate of the family contribution to education costs, I calculated what the amount of net financial saving for education would have been in each year if the expected growth rate of the family contribution to education costs had always been equal to the expected interest rate. I then calculated the difference between this amount and the actual amount of net financial saving for education and interpreted the difference as a measure of the impact of the growth of the family contribution to education costs.

(3) In order to estimate the joint contribution of the increase in the college entrance rate and the growth of the family contribution to education costs, I tried a combination of cases (1) and (2). The results of this simulation can also be used to calculate the incremental contribution of each factor (this can be done by subtracting the contribution of the other factor alone from the joint contribution of the two factors).

(4) Finally, the impact of population growth was estimated as a residual although it would also have been possible to estimate its impact directly.[26]

The detailed results of these simulations can be found in Horioka (1985, Chapter 2), but the principal findings will be summarized here. The estimated impact of each

26) The problem with measuring the contribution of population growth as a residual is that the residual also reflects the *level* of the college entrance rate, the *level* of the family contribution to education costs, and the *level* of the pre-college and college age population. However, as reported in Horioka (1985, Chapter 2), the impact of these other factors is relatively minor, meaning that the residual measures primarily the impact of population growth.

factor varies depending on the order in which the factors are controlled for, but the differences are not very significant. The most important factor for the period as a whole is always found to be the growth rate of the family contribution to education costs, the average contribution of which is 67 to 76 percent of total net financial saving for education. Second is the increase in the college entrance rate, the average contribution of which is 40 to 49 percent of total net financial saving for education. Finally, population growth was found to have a *negative* impact on the amount of net financial saving for education during the period as a whole, lowering it by an average of 16 percent. The impact of population growth is negative for the period as a whole primarily because the attainment of college age of the first postwar baby boom generation caused a substantial increase in the amount of dissaving for education during the first half of the period under study.

Turning next to changes over time in the relative importance of the contributions of the various factors, the increase in the college entrance rate and the growth rate of the family contribution to education costs were about equally important in 1968, but the former was more important from 1969 until 1972 or 1973 while the latter became more important thereafter (due to the leveling off of the college entrance rate). The contribution of population growth was higher than that of the other factors in only one year (1980).

I now analyze trends over time in the contribution of each factor in greater detail.

(1) Population growth. The impact of population growth on the amount of net financial saving for education was found to be negative and large during the first half of the period under study but gradually increased (decreased in absolute value), becoming positive in 1976 and still continuing to increase in 1982, the final year of the period under study. As shown in subsection C, the ratio between the number of individuals at the age at which their parents save for their college education and the number of individuals who are of college age was below the critical level for both junior colleges and universities during the first half of the period under study (until 1975) due to the attainment of college age of the first postwar baby boom generation. After 1975 or 1976, however, this ratio exceeded its critical level for both junior colleges and universities and showed an upward trend as the second postwar baby boom generation reached the age at which parents begin saving for their children's college education. Thus, the age structure of the population should have had a negative impact on the amount of net financial saving for education before 1975 or 1976 and a positive impact thereafter, and reassuringly, this is precisely what the simulation results show.[27]

(2) The increase in the college entrance rate. The simulation results show that

27) The aforementioned ratio was also above its critical level until the mid-1960's because of the relatively high rate of population growth and because the first postwar baby boom generation attained the age at which parents begin saving for their children's college education costs, and this should have increased the contribution of population growth toward the amount of net financial saving for education, but unfortunately I was unable to perform the necessary calculations for the years prior to 1968 and hence could not verify this.

the impact of the increase in the college entrance rate on the amount of net financial saving for education was highest in 1968–69, remained high until 1972, and declined thereafter. After 1976, its impact became negative but was relatively insignificant. Since we have assumed that households begin saving for each child's college education six years before he or she enters college, the estimated contribution of the increase in the college entrance rate in a given year should be high if the increase in the college entrance rate is rapid during the subsequent six years, and since the college entrance rate generally rose between the mid-1950's and 1976 or 1978, then leveled off or declined slightly, as shown in subsection C, we would expect the contribution of the increase in the college entrance rate to have been high from the mid-1950's until about 1970 or 1972, to have tapered off thereafter, and to have disappeared entirely or become negative after about 1976. Reassuringly, this is the exact pattern shown by our simulation results for the post-1968 period (our simulations could unfortunately not be performed for earlier years).

(3) The growth rate of the family contribution to education costs. The simulation results show that the impact of the growth of the family contribution to education costs on the amount of net financial saving for education was generally positive throughout the period under study but was highest in 1968 and also high in 1969, 1973–77 (especially 1976), and 1982. Moreover, as we saw in subsection C, the growth rate of the family contribution to education costs was especially high relative to the interest rate in 1966–68 and 1972–76 and somewhat high in 1976–82, and since the expected growth rate of the family contribution to education costs was assumed to be equal to the average growth rate during the immediately preceding two-year period, the expected growth rate was high in 1967–69, 1973–77, and to a lesser extent, in 1977–83. Thus, although the amount of net financial saving for education could not be calculated for 1967 or 1983, for the period in between, there is a close correlation between the expected growth rate of the family contribution to education costs and the estimated contribution of this factor to the amount of net financial saving for education.

Using the above results, movements over time in the amount of net financial saving for education can be explained by trends over time in the contribution of each factor. The amount of net financial saving for education was highest in 1968 (despite the negative impact of population growth, which was the result of the attainment of college age of the first postwar baby boom generation) because the contribution of the increase in the college entrance rate and that of the growth of the family contribution to education costs were both highest in that year. The impact of both factors declined thereafter, and the amount of net financial saving for education also declined, bottoming out in 1972, the same year in which the contribution of the growth of the family contribution to education costs bottomed out. The amount of net financial saving for education then increased until 1976 despite a continuing decline in the contribution of the increase in the college entrance rate because of an increase in the contribution of the growth of the family contribution to education costs and a decline in the negative impact of population growth during this period. Between 1976 and 1980, the

amount of net financial saving for education declined despite an increase in the (now positive) contribution of population growth due to a decline in the contribution of the increase in the college entrance rate and in that of the growth of the family contribution to education costs. After 1980, the amount of net financial saving for education again turned upward despite the roughly constant contribution of the increase in the college entrance rate because of increases in the contribution of the growth of the family contribution to education costs and in that of population growth (as the second postwar baby boom generation attained the age at which parents begin saving for their children's college education). Thus, the three major influences on the amount of net financial saving for education can fully explain trends over time therein.

Looking finally at future trends in the amount of net financial saving for education, it can be expected to continue its upward trend until 1985 (despite the leveling off of the college entrance rate) as the parents of the second postwar baby boom generation continue saving for the college education expenses of their children. However, after 1985, the amount of net financial saving for education can be expected to decline as the second postwar baby boom generation attains college age. In the longer run as well, the amount of net financial saving for education is likely to decline in light of the leveling off of the college entrance rate as well as of the growth rate of population.[28] Thus, the aggregate amount of education-related saving is likely to become even less important in the future than it has been in the past.

IV Conclusions

To summarize the main findings of this paper, in Section II, I found that, in Japan, education-related expenditures constitute a major expense that must be financed at least partly in advance and thus that such expenditures have a significant impact on the saving patterns of individual households, increasing the saving rates of households with elementary and junior high school students and decreasing the saving rates of households with high school and college students (especially the latter).

In Section III, I argued that the amount of net financial saving for education of the household sector as a whole would be zero in a stationary economy, regardless of the amount of education-related saving of individual households, because the saving of those saving for the future college education expenses of their children would be exactly offset by the dissaving of those with children currently in college. My calculations showed that, in the case of postwar Japan, the former was greater than the latter because of (1) the rapid increase in the college entrance rate, (2) the rapid growth of (the family contribution to) college education costs, and (3) (before 1965 and after 1976) population growth (or, more precisely, changes in the age structure of the popula-

28) Only if one or both of these factors increases anew or if there is a renewed explosion of (the family contribution to) education costs (coupled with a price-inelastic demand for education) will the amount of net financial saving for education increase anew.

tion), as a result of which the aggregate amount of net financial saving for education was positive. However, it was found to be of relatively minor importance, accounting for no more than four percent of total household saving and no more than one percent of household disposable income. In other words, even if net financial saving for education were reduced to zero, Japan's household saving rate of roughly twenty percent would fall by less than one percentage point. Moreover, it was found that the amount of net financial saving for education in Japan is likely to become even less important in the future and that it can explain trends over time in the overall household saving rate to only a limited extent. Thus, the primary explanations of the level of, and trends over time in, Japan's overall household saving rate must lie elsewhere.

In sum, education-related saving is important from the point of view of individual households but not from the point of view of the household sector as a whole in the case of Japan. This paper thus provides a dramatic illustration of the dangers of making macroeconomic generalizations based on microeconomic findings.

With respect to possible directions for further research, Horioka (1985) contains a similar analysis of saving for land/housing purchase, but I believe that it would be worthwhile applying the same approach to other saving motives as well (for example, saving for old age and saving for marriage expenses). Moreover, it would be interesting to conduct an international comparison of the relative importance of the various motives for saving and to attempt to determine the causes of any differences that are found. Such an exercise would help to explain the substantial differences that exist among countries in their household saving rates.

In short, I strongly believe that the framework that has been developed in the present work for analyzing target saving for specific motives holds great promise and that it should be refined, extended, and applied to other motives. Past analyses of household saving typically estimate what is essentially a reduced form, with saving being made a function of income, demographic characteristics, and other exogenous variables, but since saving is done with a particular motive or motives in mind, it seems more fruitful to explicitly incorporate those motives into the analysis. Such an approach would not only facilitate the identification of possible influences on household saving but also provide a theoretical justification for the importance of those influences and allow us to conduct simulation analyses.

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